USDA

Agricultural Research Service

George E. Brown, Jr. Salinity Laboratory

Biennial Report 1999-2000

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Laboratory Director

Michael C. Shannon

Area Director

Antoinette Betschart

INTRODUCTION

We exit one millennium and begin another with a new name and new challenges. On January 21, 2000, the U.S. Salinity Laboratory was renamed in honor of the late congressman George E. Brown Jr. who's legislative efforts to advance agricultural technology and international cooperation led to the construction and dedication of the new USDA-ARS Riverside facility. Our Laboratory has long been known for its cutting edge technology and joint science projects with other countries. Brown saw a need to improve the working conditions of agricultural scientists and fought for a decade to obtain funding to build a modern, state-of-the-art facility to replace the aging lab that had operated near Mount Rubidoux for 58 years. The new laboratory opened in 1995 and was renamed and dedicated to Congressman Brown after his death in 1999. The George E. Brown Jr. Salinity Laboratory continues to serve the research needs of U.S. agriculture through its relevant, productive and creative scientific research programs.

As water quality and quantity becomes limited globally, problems associated with salinity have increased dramatically. Since agriculture is by far the dominant user of most of our water supply, there is growing interest in increasing the efficiency of water management through reuse of agricultural drainage water and other water currently considered as municipal or industrial waste water. There is an increased demand for salinity assessment criteria and measurement methods and tools; and there is a greater need to make more reliable and useful decision support models available to growers, water and drainage districts, and state and federal decision makers. Public concern for environmental and human health and safety have resulted in demands to reduce the impact that agricultural practices have on loading groundwater and surface water with salts, pesticides, nitrates, and other potentially toxic ions. Human health and safety is an emergent research concern associated with water reuse. It will be up to our staff to address these important issues and to contribute, through research and technology transfer, to solutions.

Last year the Laboratory responded to the changing needs of the agriculture through the addition of a new research group. The Food Safety Research Group is focused on preventing contamination of surface and ground waters from microbiological and chemical contaminants from concentrated animal feeding operations. The new research project will be led by new hires Mark Ibekwe, Microbiologist and Scott Bradford, Soil Scientist. Pamela Watt, Microbiological technician was also hired to assist the group. Xuan Liu, Biological Science Technician also began work during the year and will be assisting Clyde Wilson in the Plant Science Unit. The Soil Physics and Pesticide Research Unit hired one postdoctoral scientist, Robert Dungan to study how soil microorganisms help degrade fumigants.

In 1999, Frank Dalton retired after over 20 years of Federal Service. Dr. Dalton has been a pioneer in developing a dynamic salinity stress index that characterizes the effects of variable soil and climate factors on plant response. This work is truly unique and creative and will lead to future understanding in plant salinity stress research.

Other retirements include Robert LeMert from the Soil & Water Chemistry group after 44 years of Federal Service and Gladys Greer, Administrative Officer, who retired from the Location Office after 58 years of Federal Service. Other significant highlights include National and Area Awards.

As usual, several Salinity Laboratory scientists were recognized for outstanding achievement during the year. Sabine Goldberg, Soil Scientist, received the Soil Science Society America Fellow Award in 1999 from USDA for her research on adsorption chemistry of nutrient and trace element anions in soils and the effect of variably-charged surfaces on soil structure. Dennis Corwin, Soil Scientist, received the Stanford University's Cox Professor Award in 1999 in recognition of the pioneering work and continued accomplishments for the application of Geographic Information Systems and other advanced information technologies to the assessment of non-point source pollutants in the vadose zone. Martinus Th. van Genuchten, Supervisory Soil Scientist/Research Leader, received the 1999 Don and Betty Kirkham Soil Physics Award for recognition of outstanding contributions in the area of soil physics. Many others received local awards for their excellent efforts in research, research support, and activities associated with outreach, safety and civil rights. Our research effort during the last two years, led by our 14 research scientists, yielded over 100 publications excluding abstracts.

In the coming years we look forward to new challenges, great scientific accomplishment, and continued improvement of our scientific effort and productivity.

Michael C. Shannon
Director

GEORGE E. BROWN, JR. SALINITY LABORATORY STAFF

NAME	TITLE
Alves, Bill	Computer Specialist
Austin, Richard	Electronics Technician
Bradford, Scott	Soil Scientist
Carroll, Peggy	Accounting Technician
Cliath, Mark	Chemist
Collier, William	Administrative Officer
Cook, Roberta	Secretary (Physics & Pesticide)
Corwin, Dennis	Soil Scientist
Dalton, Frank	Soil Scientist
Donovan, Terry	Agronomist
Draper, John	Biological Technician (Soils)
Dungan, Robert	Postdoc Scientist
Ernst, Fred	Soil Scientist
Fargerlund, JoAn	Physical Science Technician
Faust, Steve	Machinist
Forster, Harry	Physical Science Technician
Gan, Jay	Associate Researcher
Goldberg, Sabine	Soil Scientist
Greer, Gladys	Administrative Officer (retired 01/00)
Grieve, Catherine	Plant Physiologist
Hopper, Jennifer	Physical Science Technician
Huber, Mike	Engineering Technician
Ibekwe, M.	Microbiologist
Jobes, Jack	Agricultural Science Research Technician (Soils)
Layfield, Donald	Analytical Chemist
Lebron, Inma	Soil Scientist
LeMert, RoseAnn	Physical Science Technician
LeMert, Robert	Senior Farm Machinery Mechanic
Leij, Feike	Soil Scientist
Leung, Suzanne	Postdoc Scientist
Lesch, Scott	Senior Statistician
Liu, Xuan	Plant Physiologist
Luther, Sondra	Secretary (Plant)
Manning, Bruce	Soil Scientist

NAME	TITLE
Moore, JoAnn	Purchasing Agent
Mohanty, Binayak	Assistant Researcher
Nash, Phyllis	Statistician
Orlauski, Janice	Office Assistant
Padgett, Karen	Secretary (Director)
Papiernik, Sharon	Soil Scientist
Rose Coons, JoAnne	Secretary (Chemistry)
Poss, Jim	Soil Scientist
Rhoades, James	Soil Scientist
Russell, Walt	Mathematician
Schaap, Marcel	Soil Physicist
Shannon, Mike	Director/Supvy. Research Geneticist
Shouse, Pete	Soil Scientist
Skaggs, Todd	Soil Scientist
Simunek, Jirka	Hydrologist
Suarez, Donald	Research Leader/Supvy. Geologist
Taylor, Chris	Chemist
van Genuchten, M. Th.	Research Leader/Supvy. Soil Scientist
Vaughan, Peter	Research Hydrologist
Vishteh, Nahid	Biological Science Technician
Wang, Dong	Soil Scientist
Watt, Pam	Microbiologist
Wilson, Clyde	Plant Physiologist
Wood, Jim	Soil Scientist
Yates, Scott	Soil Scientist
Zeng, Linghe	Research Geneticist
Zhang, Ping	Staff Research Associate

1999-2000 VISITING SCIENTISTS ON STAFF

(Argentina)
Maria Correa

(Belgium)
Fariborz Abbasi
Diederik Jacques

(China)
Weiiping Liu
Qi-Quan Wang
Chi-Chuang Wang
Shi-Kui Xue
Chengyi Zhao
Jianting Zhu

(Denmark)
Christen Borgesen

(Egypt)
Mohamed Elsayed Galal
Akmal Karimov
Ahmed H. Khater
Mohamed Eldayed Shahab
Ahmed Ezzat Abdel Wahab
Basyouni Abdel Razak Zayed

(Hungary)
Attila Nemes
Tibor Toth

(India)
Lalit Arya

(Italy)
Paolo Castiglione

(Japan)
Takeshi Ishizaki
Qingli Ma
Naomasa Nishimura
Tomoko Yoshida

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Laboratory Program

HISTORY

In May 1995, the George E. Brown Jr. Salinity Laboratory moved to a state-of-the-art facility on the campus of the University of California at Riverside. The laboratory, which was established in 1937, previously occupied 10 acres south of Mount Rubidoux in western Riverside.

The new building includes offices, constant temperature rooms, and 18 different laboratories. Four greenhouses and three environmental chambers are conveniently attached to the main building. A climate-controlled rhizotron, lysimeters and sand tank facilities are also located on USSL grounds, along with mechanical and electrical shops.

Sixteen permanent scientists as well as ten post-doctoral researchers and twenty technicians work under three research units: Soil-Water Chemistry and Assessment, Plant Science & Food Safety, and Soil Physics-Pesticides. Scientists from many foreign countries frequently visit the laboratory for education and technical exchange.

The laboratory works closely with USDA's National Resources Conservation Service (formerly the Soil Conservation Service) and the U.S. Bureau of Reclamation. Close cooperative relations are also maintained with the state agricultural centers around the world**.**

The George E. Brown Jr. Salinity Laboratory has served as a model for the establishment of Salinity Laboratories in India, Australia, Egypt, Israel, and Canada.

Irrigation is an ancient and yet important agricultural practice. Crop yields are higher under irrigation and less dependent on the effects of weather. While accounting for 0nly 15% of the world's cultivated land, irrigated soils produce 35-40% of the global food harvest; much more in semiarid and arid lands.

Unfortunately, irrigation often leads to the buildup of salts, toxic chemicals, and pesticides in associated soils and waters. Yield reductions related to salinity occur on an estimated 30% of irrigated land in the United States and 50% or more in some other nations. Approximately 10 million hectares (25 million acres) are permanently being lost each year from agriculture as a result of salinity and related problems.

The George E. Brown Jr. Salinity Laboratory is the nation's primary facility dedicated to basic research on salinity problems in agriculture. The laboratory is operated by the USDA Agricultural Research Service.